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Patent Abstracts of Japan

PUBLICATION NUMBER : 01238173
PUBLICATION DATE : 22-09-89

APPLICATION DATE : 18-03-88
APPLICATION NUMBER : 63066327

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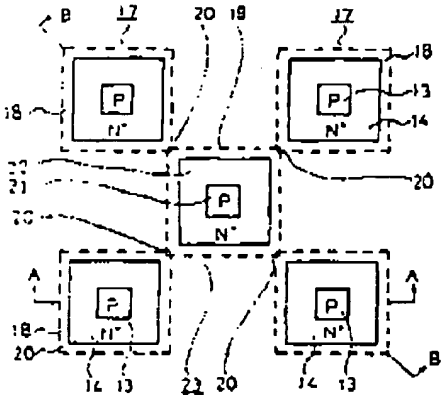
INT.CL. : H01L 29/78

TITLE : POWER MOSFET



ABSTRACT : PURPOSE: To miniaturize a cell and to reduce an ON resistance by providing a second channel region to be superposed on the corner of a channel region on a region surrounded by the the cell, and also providing a source region and a source electrode on the surface of the second channel region as a second cell.

CONSTITUTION: Second channel regions 19 are so provided at a part surrounded by a gate cell 17, i.e., at a position displaced by a half pitch from the pitch of cells 17 as to be superposed on the four corners 20 of a channel region 18. The regions 19 are specified by a P-type diffused region 21 and an N^+ type source region 22 formed among the cells 17, a gate electrode 15 on the surface is opened to dispose a source electrode, thereby utilizing here as the operation of a MOSFET as second cells 23. Thus, electric field concentrations at the corners 20 of the cell 17 are alleviated to prevent the breakdown strength from deteriorating, thereby improving the breakdown strength of the whole cells 17, and the region 18 is formed to be shallow, thereby miniaturizing the cells 17.

ABSTRACT / ZUSAMMENFASSUNG / ABREGE

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A low on-state resistance power semiconductor device has a shape and an arrangement that increase the channel density and the breakdown voltage. The power semiconductor device comprises a plurality of individual cells formed on a semiconductor substrate (62). Each individual cell comprises a plurality of radially extending branches (80) having source regions (37) within base regions (36). The plurality of individual cells are arranged such that at least one branch of each cell extends towards at least one branch of an adjacent cell and wherein the base region (36) of the extending branches are merged together to form a single and substantially uniformly doped base region (36) surrounding drain islands (39) at the surface of the semiconductor substrate (62). Solire